# CONTINUOUS IMPROVEMENT PROJECT DATABASE

## *DIVISION 9 PROJECTS*

| Project Name | Project Description | Division | Project Year | Contact Name | Contact Number | Project Category |
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| Chain Caddy | The process of manually cutting equipment chains to length required the use of a bolt cutter. This had to be handled by two people forcing the tool to be used in a manner that could cause injury.<br>The solution to these problems is the Chain Caddy. This allows cutting of equipment chains in a controlled fashion greatly limiting the chance of slips, trips and falls during this task. Though the initial cost of the construction is about $402.00, it will be quickly gained back by the savings in labor hours, one man vs. two, and the replacement cost of the bolt cutting edges. The Chain Caddy provides a safe and efficient task station where chains can be cut to length. It is a tool which can help eliminate injuries caused by slips, trips and fall. | Div 9 | 2009 | Mark Crook | (336) 249 7001 | Safety Improvement |
| Pre-Augering H-Piles in Weathered Rock for Interior Bents | Problem: Several decades ago bridges were designed to resist scour. In recent years, to improve lateral stability of interior bents that will resist the destabilizing effects of scour, NCDOT engineers have shifted from driven pile foundations and spread footings to drilled pier foundations resting within rock sockets. These drilled pier foundations are significantly more costly than previously used foundations. To save money and better utilize resources, we developed a new installation technique for piles to be installed within a rock socket.<br><br>Solution: The Geotechnical Engineering Unit uses one of their CME 55 drill rigs with 12 inch augers to pre-auger the hole into weathered rock to a depth sufficient for lateral stability. Bridge Maintenance then drives the H-pile with their pile driving hammer into the pre-augered hole. | DOH- Div 9, Div 12, BMU, & GEU | 2007 | John Fargher | (704) 455-8902. | Dollar Savings |
| Sign Board Safety Mirror | Problem: The Incident Management Assistance Program (IMAP) drivers in Divisions 7 and 9 were having trouble verifying that the arrow board was up and functioning properly without getting out of the truck to visually inspect the board.<br><br>Solution: In order to lower the risk of drivers being struck by passing motorists, a sign board safety mirror was placed on the truck to view the arrow board from inside the cab of the truck. | Operations - Divisions 7/9 | 2006 | Sam Whittington | (336) 315-7080 | Safety Improvement |
| Quick Connect Snow Plow | The current process of connecting snow plows to truck frames usually required 3-4 employees, a sledgehammer, a pry bar and 10-15 minutes. Also, the process required employees to be between plow and truck. A Stokes County maintenance team fabricated parts and modified their plows & frames using a quick connect system based on the PennDOT's in-house design. New design now takes 1 person 2 minutes to connect the plow to the frame and also reduces employees exposure to safety hazards. | Div 9 | 2003 | Kent Boyer | (336)593-8541 | Safety Improvement |
| Road Oil Database | There continues to be difficulty in record keeping on paving history within the division and providing access to this information for all departments. A division database was created in ACCESS to record all aspects of road paving. As a result county engineers and otherdepartment heads now have access to the database that allows them to identify roads that Road Oil has paved and those that havereceived markings. This information reduces the need to send out a<br>person to identify whether a road that has been paved needs<br>remarking. | OPERATIONS - DIVISION 9 | 2003 | Noel Chilton | (336) 896-7019. | Environmental Sustainability |
| Rest Area | The Division endeavors to provide safe and attractive rest areas at a reasonable cost to the taxpayer. At times situations arise thatrequire job specific equipment for short periods of time. We<br>obtained a Purchase Order Contract with a local equipment rental company for daily, weekly, and monthly rentals. Some equipment used are 1) concrete planers for uneven sidewalks, 2) stump<br>grinder for removing dead trees, 3) small backhoe for plumbing repairs, and 4) concrete mixer. This equipment rents from $60 to $125 per day and $180 to $375 per week. Purchase of this equipment would cost from $2500 to over $16,000. | OPERATIONS - DIVISION 9 | 2002 | J. M. Lineberry | (336) 896-7039 | Dollar Savings |
| Injection Truck | When calculating the amount of material per acre, the injection system takes 50% less time than the conventional method. The computer on the injection system does the calculations and has been tested 100% accurate. Also, the injection tanks mixes the accurate amount of material needed, eliminating guesswork and<br>reducing wastes/overage. At day's end all work accomplished can be printed out. In past there was a need for a crash truck, advance warning and a sign crew (4 pieces of equipment and 5 men). Now 1 man and 1 piece of equipment do the same task. It has also improved safety in that it is off road and not endangering the public.<br>All work is done out of travel lanes. | OPERATIONS - DIVISION 9 | 2002 | Jeff Hardy | (336) 896-7039 | Labor Hour Savings |

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| Tax Maps | Due to the increased workload on the District Office, a time saving method was needed to enable District staff to process secondary road and new addition packages in a timelier manner. All four required sets of each package were individually prepared and each package took 4 hours to assemble after the information was gathered. Most tax maps are now obtained through the use of compact disc, edited through Word, and then copies made from the original set. | OPERATIONS - DIVISION 9 | 2002 | David Lipe | (704) 639-7560 | Labor Hour Savings |
| Work Zone Signing Removal | Work zone signs that are not removed from the project at the completion of the project are a safety hazard to the traveling public and DOT maintenance operations. This problem occurs most often on contract resurfacing projects. These projects have a large number of signs scattered over many locations. When work zone signs are abandoned on the project, it is only a matter of time before the sign and upper U-channel post are removed by passersby or damaged. Once the upper U-channel posts are gone the lower U-channel posts that remain are the real safety hazards. These posts are easily concealed in the grass on the shoulder and could cause damage to right-of-way mowing equipment and vehicles that pull off onto the shoulder. | OPERATIONS - DIVISION 9 | 2002 | Mark Crook | (336) 249-7001 | Safety Improvement |
| Road Oil Database | There has always been difficulty keeping records on the paving history within the division and providing access to this information to all departments. With the creation of a division database to record all aspects of the paving of each road, county engineer now have access to all pertinent information regarding the roads paved in their county. Road ratings can also be integrated in the database to provide rating information on all primary and secondary roadways within the division. Traffic services also gets a biweekly printout including length, to and from, to assist them in planning for the markings. | OPERATIONS DIVISION 9 | 2001 | Noel Chilton | (336) 896-7019 | Communications |
| Subdivision Review | In the year 2000, the Salisbury District Office reviewed the design of 60 proposed subdivisions for their compliance with state standards. Included in this review was the analysis of the proposed storm drainage system of new subdivision roads. In the past, all subdivision plans with curb and gutter were sent to the Hydraulics Unit in Raleigh for a review of the storm drainage. This process took an average of three weeks per subdivision for the plans to be mailed to Raleigh, reviewed, and returned to the district office.<br><br>To reduce the amount of time necessary to review each subdivision, an engineer from the Hydraulics Unit came to the district office and trained the technicians in the district so that they were competent to perform some of the reviews in-house. | OPERATIONS DIVISION 9 | 2001 | David Lipe | (704) 639-7560 | Customer Service |
| Tackifier Application Efficiency | Seeding crews use CRS-2 asphalt emulsion as a tackifier over the top of grain straw mulch applied on seeding jobs. In the past, truck-towed asphalt kettles of 600 gallon capacity have been used. These units are messy to work with, time consuming to heat if they sit overnight, and must be unhooked from the trucks to be heated. The problem of finding a safe place to drop the kettle, re-heat and wait for a spare or empty truck is compounded by the straw mulch blowing away from the shoulders due to traffic. The lull between the mulch application and the tackifier application results in poor quality work and in loss of time. This reduces the efficiency of the crew in moving on to the next job site. The poor mulch retention along the roadways often requires re-application of both mulch and tackifier in order to protect the shoulder from eroding.<br>Two 1250-gallon asphalt distributors were obtained from the Division 9 Equipment Department when the Division 9 Bituminous Department turned them in. The Equipment Department re-fitted the rear of the units to use a hand spray wand. A pintle hook was attached to the rear of the distributor to enable the crew to carry a mulch blower to the job site as well. | OPERATIONS DIVISION 9 | 2001 | P. H. Suggs | (336) 896-7039 | Cycle Time Reduction |
| Mulch Application Efficiency | During a review of work processes, crew leaders and personnel indicated a desire to make the mulching operation of their roadside work more efficient. Due to current technology, the application equipment is as efficient as possible. The larger problem is the supply of mulch materials on the job site. A review of the process revealed that the truck payload size required the mulch blower to be hooked to and unhooked from multiple trucks to complete projects. The loading and handling of the trucks proved to be the most time consuming factor in this process. Fewer truck changes would mean more time applying mulch.<br>The team set out to determine the most efficient way to increase the straw mulch payload safely. Utilizing the current trailers to haul straw required too much extra handling. The team discussed putting a pintle hook on the rear of the trailers. This allows the mulch blower to be hooked directly to the trailer. The Division 9 Equipment shop reviewed the request with the Division Safety Officer and outfitted the trailers with the pintle hooks. | OPERATIONS DIVISION 9 | 2001 | J. D. Tucker | (336) 896-7039 | Cycle Time Reduction |

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| Roadbind | On secondary road construction projects, one of our greatest costs is ABC stone for our base. Our normal procedure is to place 8 of ABC stone and then pave with BST. On project 6.640011, we substituted 4 of ABC stone base with an application of roadbind adhesive to the remaining 4 of ABC stone. We then scarify the stone base to mix the roadbind into the 4 of stone and regrade. Then compact and allow it to cure 1-2 weeks before paving with BST.<br><br>Roadbind is a by-product from the pulp mills. It is lignon that binds the fibers of the tree together. This lignon when mixed with the ABC creates a stronger bond between the stone aggregates and creates a stronger base. The advantages of roadbind are 1) Equal to or stronger than stone base alone. 2) Dust inhibitor. 3) Reduced time for stone setup. 4) Lower cost. | OPERATIONS DIVISION 9 | 2001 | Kent Boyer | (336) 593-8541 | Dollar Savings |
| Guardrail Sign Mounts for Median Guardrails<br><br>Median Guardrails | Due to the installation of the median guardrails on our multi-lane highways, additional signing is needed to safely operate the spray trucks. Mounting signs in conventional stands is dangerous to both State forces and the public due to having to carry the sign and stand across multiple lanes and then erecting it on a narrow shoulder. We looked at several commercial sign brackets for mounting signs on posts or rails but none were completely compatible with our signs or the guardrails. Using metal stock, we designed a simple bracket that will attach to different guardrail widths and can be used with our current roll-up type signs. It is less cumbersome than any commercial model we examined and therefore safer to carry across the roadway. Time saved in erecting the sign means less exposure to traffic. The cost of the commercial sign mounts varied from $35.00 to $45.00 per mount with additional costs added for standards and uprights to attach the signs. Utilizing our welding shop, we used raw metal stock to make the mounting bracket and salvaged square tubing from obsolete sign stands for the uprights. | OPERATIONS DIVISION 9 | 2001 | P. H. Suggs | (336) 896-7039. | Dollar Savings |
| Off Road Herbicide Truck | The Division Nine-Roadside Environmental Department was faced with the challenge of continuing herbicide applications while improving safety and efficiency. In response to a series of accidents during herbicide applications in the east, it was decided to explore a safer method of applying herbicides.<br><br>A study was completed by the Division equipment personnel and those from Roadside Environmental for the construction of an off-road herbicide application truck.<br><br>A truck was fabricated from an existing flat bed truck and modified for off-road use. | OPERATIONS DIVISION 9 | 2001 | Speedy Floyd | (336) 631-1340 | Dollar Savings |
| CRS-2 Loading Hose Overflow Collector | After reviewing the former practice of loading CRS-2 into the asphalt distributor, the team discovered a considerable amount of CRS-2 was dripping onto the ground after loading had occurred. In order to prevent excess CRS-2 from being spilled onto the ground, the maintenance mechanic on the yard developed a sealed containment system for connecting the dripping CRS-2 hose after the loading is completed. The solution involves placing a quick connect system on the end of the loading hose and also on top of a 55 gallon barrel. This sealed barrel prevents the CRS-2 from dripping onto the ground and adversely effecting the environment, as well as preventing rainwater from entering the storage container | OPERATIONS DIVISION 9 | 2001 | John Rhyne | (336) 631-1360 | Environmental Sustainability |
| Drill Press for Concrete Patching | Concrete patching is necessary when a concrete slab breaks or potholes occur. Holes are drilled (doweled) into the existing damaged concrete so that rebar (steel bars) can be placed on six-inch centers across the width of the area to be patched. The rebar is placed in the doweled holes to serve as a load transfer mechanism from the new to the old concrete which ties everything together.<br><br>The existing drill used weighs eighteen pounds and requires two people because of the awkward positioning of bending and/or squatting. Drilling the holes would be similar to jackhammering horizontally about five inches off the ground.<br><br>The Forsyth Maintenance team started using a new drill press for concrete patching that is easier to use and only requires one person to operate. | OPERATIONS DIVISION 9 | 2001 | Gary Neal | (336) 896-7014 | Labor Hour Savings |

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| Guardrail Sign Mounts for Median Guardrails | Due to the installation of the median guardrails on multi-lane highways, additional signing is needed to safely operate the herbicide spray trucks. Mounting signs in conventional stands is dangerous to both State forces and the public because workers must carry the sign stand across 2-4 lanes of highway in the face of speeding cars and trucks. The median guardrails do not allow enough room for a worker and truck to stop in the median and open doors, unload signs and racks, and safely erect the signs. Mounting the signs inside the median does not provide adequate visibility.<br>Using the Equipment Unit's welding shop, the Division 9 Roadside Environmental Herbicide Crew designed a simple mounting bracket that will attach to different guardrail widths and can be used with the current roll-up type signs. It is less cumbersome than any commercial model and safer to carry across the roadway. The Division 9 team used eight sign mounting brackets with a total cost of $96 in material and labor. A comparable cost for commercial brackets would have been approximately $300 to $450. | OPERATIONS DIVISION 9 | 2001 | P. H. Suggs | (336) 896-7039 | Safety Improvement |